A Draught of the Streights of Gibraltar.

WITH

Some Obſervations upon the Currents thereunto belonging.

By Captain Richard Bolland.

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WE weigh'd Anchor, out of *Tangier* Bay, near eight in the Morning, the Wind at S.S. Weſt off the Shoar, very moderate; before Ten, the Tide of Ebb then ſetting to the Weſtward, had drove us down the length of *Jews* River, which having obſerv'd, that I might ſomething more improve my judgment on the Tides and Currents in theſe parts, I then produc'd this Draught of the Streights Mouth of *Gibraltar*, which I had drawn ſometime before; having often croſs'd over from the one Shoar to the other, as alſo anchor'd ſeveral Boats, half a League diſtant from one another, that they have reach'd one third of the Chanel over; having on Board of each of them, Watches for Time, Logs to inform the turning of the Tide, and ſeveral other Conveniences proper for thoſe Obſervations; by which means, I gain'd ſome experience how the Tides ſet, their time and diſtance from the Shoar; as alſo where the Current, which has its conſtant Indraught into the Streights, if extremes of Wind occaſion no alteration, does commence from the Tides. Having thus gather'd theſe Collections, I drew this Draught, as it is here demonſtrated at large, and Calculated the Tables thereupon plac'd, which are for every Day in the Moon's age, that is, from Full to Change, and from the Change to the Full; ſo that looking upon theſe Tables, you are inform'd at all times, when the Tides flow to the Eaſtward, and Ebb to the Weſtward, upon both Shoars. Our Ship having thus drove contrary to our Courſe, that Day being the twelfth of the Moon's age, I found in the Table for the Offing upon the *African* Shoar, that the Tide began to flow to the Eaſtward at Ten a Clock, and 21 Min. By this time the Wind ſprang up freſh Eaſterly, and increaſed ſo furiouſly, that we were forc'd to Reef our Top-ſails, having now the advantage of the Tide; here the Current in the middle, as alſo the Tide upon the *Spaniſh* Shoar, which began that Day to flow to the Eaſtward, at 11 of the Clock and 16 Minutes. Thus happen'd the time ſo opportunely, that ſtanding the nearer both the Shoars was the greater advantage, making no more than three Boards we weather'd the Eaſternmoſt Point of *Gibraltar* above two Leagues. Thus did we make a clear Experiment of the truth of theſe Tables and Draught. The ſame advantage may be made in turning out of the *Streights* with a *Weſterly* Wind, only ſtopping the Tide of Flood, if Weather will permit. For want of Experience in the Tides and Currents here, this Age has produc'd but too many Examples of the loſs both of Men of War, and of Merchant-men. I remember in the Year 1663, Sir *John Lawſon*, in the *Reſolution*, having been in the *Levant*, coming near to *Gibraltar* in the Night, the Current having ſet us over cloſe on board the *Spaniſh* Shoar, we made the Highland of *Gibraltar*, for *Apes-Hill* upon the *Barbary* Shore, which had like to have prov'd of very dangerous conſequence, our Courſe being right over the Low-land, which General *Blake* had intentions of cutting through, to have made an Iſland. Having heard many Diſputes concerning Tydes and Currents, I will here, in few words, give my Opinion of them. And firſt of Tydes, which as is obſerv'd, have a dependency upon the Motion, Increaſe, and Decreaſe of the Moon.

It flows in the Bay of *Tangier*, and ſo upon the *Barbary* Shoar, as far as *Apes-Hill*, *South-weſt* and by *South*, one quarter after two a Clock, Full and Change of the Moon, high Water. The *Moors* and *Spaniards*, upon each of their Native Shores, in the *Streights* Mouth of *Gibraltar*, thus account the Tydes. When the *Moon* appears in their Horizon upon her riſing, the Tyde ſets away to the *Weſtward*, and continues till her coming to the Meridian; which having paſſed, the Tyde begins to flow to the *Eaſtward*. I cannot be ſo poſitive in my Opinion as ſome are, that the Moon has an abſolute Influence upon the Government of Tydes, and therefore ſhall lay down my Reaſons with ſubmiſſion to better Judgments. If the *Moon*'s attraction be ſo powerful upon the Waters, why do they not follow her motion round the World? At Prince *Rupert*'s Bay, within three Leagues of *Apes-hill*, in the *Streights* Mouth of *Gibraltar*, the Tyde riſes perpendicular upon the Springs Nine Foot. At *Buceama*, upon the *Barbary* Shore, 20 Leagues to the *Eaſtward*, there's ſcarce any knowledge of a Tyde. So that in ſo ſhort a diſtance, the *Moon*'s influence upon the Water ceaſes. At *Cape Spartel*, which is the *Weſtermoſt* part of the *African* Shoar, it flows *South*, *South-weſt* a very ſtrong Tyde. Five or ſix Leagues *Weſt*, *South-Weſt* into the Sea, there is no appearance of either Ebbing or Flowing. So that here to the *Weſtward* into the Ocean, as alſo to the *Eaſtward* mentioned before, in the *Mediterrancan*; the Waters have no dependance upon the *Moon*. Theſe Demonſtrations, with many others which might be laid down, induce me to the Opinion, That the *Moon*'s Change, Full, and Quarter, as alſo her Motion, are particular Signs to inform our Judgments, rather than of any Power ſhe has on the Waters, or their dependance on her. The great Maſter of Philoſophy drowned himſelf, becauſe he could not apprehend the Cauſe of Tydes; but his Example cannot be ſo prevalent with all, as to put a Period to other Mens Inquiries into this Subject. I hope it will be allow'd that a Sailor, by his Experience in this Age, may better know the ſhifting of Tydes in ſeveral Parts than *Ariſtotle*, tho' not the Cauſe; which ſince no Man has attain'd to, but only conjectural Notions, I hope mine will be the more excuſable. The Holy Writ mentions a Chaos, or firſt Matter, which was a confuſion or diſorder'd Maſs of all the Elements, wherein God Almighty divided the Earth from the Water, which Diviſion naturally put the Waters in motion by a Reverſe, or Retreat from their firſt Poſition. After that, the Earth was made dry Land, the Waters return'd to ſeek their former Place, and to claim their Dominion over the more ſolid and conſiſtent Bodies; by which ambition they rais'd themſelves up to the High-water-mark, where they were reſtrained and bounded by the Heavenly Power; ſo that being able to advance no higher, they return'd to the Ebbing; and ever ſince it might be God Almighty's Providential Will, for the convenience of Man, to continue the ſame motion of the Water. I have no other Reaſon or Apology to make for this my Opinion, than that in moſt parts of the known World, the Waters have the ſtrength of their Motion near to the Shoars, and at Sea ſcarce any thing at all but what is occaſion'd by Winds. Which brings me to the Courſe of Currents, that have no dependency upon the Moon, having obſerved principally three ſorts of Currents or Streams, occaſioned by a Trade Wind, the indraught of Bays, as that of *Biſcay* and the Gulph of *Lions*; a forceable Stream betwixt two High Lands coming from the Ocean, as the Current proceeding from the *Streights* Mouth of *Gibraltar*, where in the middle part (demonſtrated upon the Draught between the two Lines *M M*) The Current has its continual paſſage into the *Mediterranean*, if not alter'd by ſome extream of Weather. And altho' I know ſome are of a contrary Opinion, yet there is nothing that reſembles Truth more, than Demonſtration upon Matter of Fact. In Nine Years that I have liv'd and ſail'd from *Tangier*, I did never ſee any Ships in the middle of the *Streights*, happening then to be calm, or little Wind, but was infallibly driven in, if ſhe could not reach the ſide of Ebb upon neither Shoar. This, I ſuppoſe may be ſufficient to demonſtrate that there is a vaſt Sluce of Water hurry'd into the *Streights*. At *Conſtantinople* out of the *Black-Sea*, it runs into the *Mediterranean* a forcible Stream, and many large Rivers fall into the ſame Seas. The Queſtion is, what becomes of all this Water? The Tydes flow Six Hours, and Ebb the ſame ſpace, ſo that probably they return what they bring in; the Earth no doubt, on all Shoars, does drink in and is moiſten'd by the Sea; the Sun has its attractive influence on the Waters; I have often

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The Deſcription of the Sounding-Boat *for Currents.*

THEN having the Lead, which I have made, as the Draught here demonſtrates with Springs in the inward part, a Bladder hook'd upon the outſide, which has a dependency upon thoſe Springs, ſo that the Lead ſtriking the Ground, off flies the Bladder from the Lead, and all the way in its riſing to the Superficies of the Water, it is drove which way ſoever the Current does ſet, your Ship being ſtopp'd by her Anchor, if the Current ſet out of the *Streights* below, then will the Bladdar riſe a-head of the Ship, contrary to the Current aloft. Now where your Ship is Anchor'd in 300 Fathom water, I will ſuppoſe it flows into the *Streights* 100 Fathom deep, from the Surface, and from that 200 Fathom to the bottom, it runs out to the *Weſtward*. To know the certainty of this, or what depth it ſets contrary, I have here drawn the Draught of a Square Dragg-Sail at the Boats Bow, with Weights of Lead, at the lower part, to depreſs the Sail downward; ſo turning the Boat looſe you lower the Sail unto the Water, and which way ſoever the Stream runs, it will draw along the Boat If it returns out of the *Mediterranean* at 100 Fathoms deep, the Sail being lower'd to that, then it will not fail of Dragging your Boat contrary to the Current aloft. Thus might the Experiment be made to the ſatisfaction of the curious.

The ſounding Boat for Currents in the Draught No. 2, there is the form of a Sail mark'd *G*, which has two Yards, one aloft, the other below; by which means, if my Judgment fails me not, it will ſtand ſo fair, as to keep full within leſs than three Points of the Compaſs. In the Hold of the ſame Boat mark'd F, I have form'd a ſort of work, which gives a true Account of the Boats way by her Motion, hoping it may prove of general uſe, more in particular unto Draughts-men, whoſe care ought to be in laying down Capes, and Head-lands, exactly to the diſtance.

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